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Measurement of blood plasma coagulation time - using optical density method, suitable for oxalated or citrated plasma

Electronic apparatus for measuring coagulation time of blood plasma comprises a photoelectric cell and a chronometer, stopped by examining by a suitable logic the first three derivatives to appear.

ADVANTAGE

Suitable for oxalated plasma which reacts with Ca^{++} ions and stops clocks prematurely in simple apparatus.

DETAILS

Citrate as blood anticoagulant does not interfere with clotting time assays, but oxalate reacts with Ca^{++} ions to give an insoluble calcium oxalate making coagulation point difficult or impossible to see. When oxalated plasma is added to Ca^{++} the initial turbulence is used to start the timing mechanism. The Ca oxalate ppte. appears almost immediately and is complete after about 15 s.

The coagulation itself cooperates differently in normal and pathological plasmas. In normal plasma, coagulation occurs pathologically plasmas. In normal plasma, coagulation occurs about 10-15 s after mixing and figs. 1a, 1b and 1c show the evolution of the first three derivatives of the optical density curve. An arrow on the curve indicates the coagulation point (the reading is suppressed in the first 5 s after mixing or the timing mechanism would be prematurely stopped).

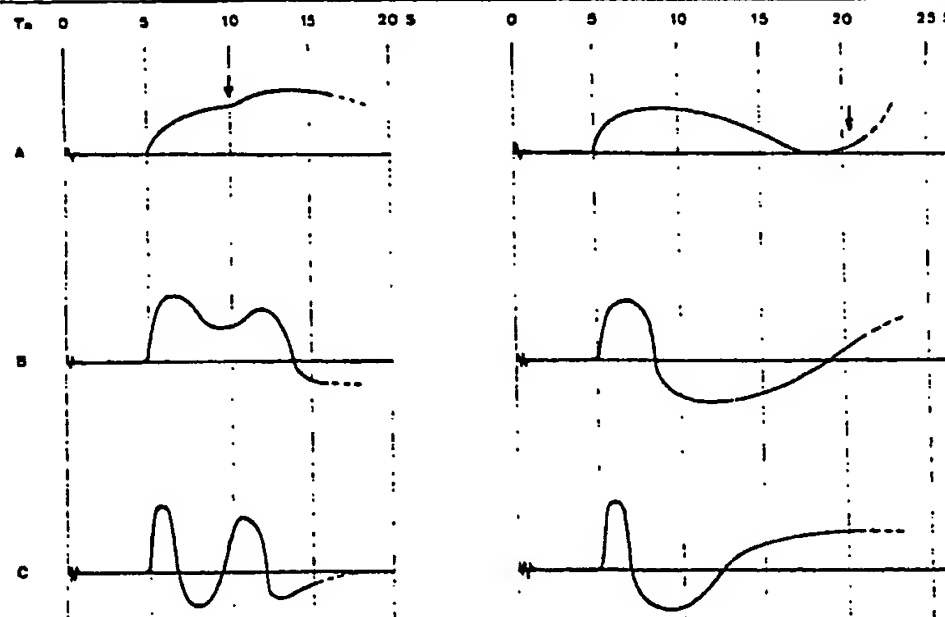
E(4-B4D, 11-C7, 12-K4, 12-M4) J(4-C2). 4

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In pathological plasmas (figs. 2a, 2b, 2c) the coagulation is delayed up to 40 s and more. The slope of the curves of the first derivative (1a, 2a) are reduced but never reach zero (2a) and only just zero (1a). It will be seen that the second derivative of the signal becomes negative and remains so in normal plasma (1b), and in pathological plasma (2b) becomes negative and then once more becomes positive. The third derivative (1c) of normal plasma becomes positive, negative positive and then negative.

The third derivative with pathological plasma (2c) becomes positive then negative and finally positive. Comparing 1b with 1c and 2b with 2c it will be seen that when both of each pair of curves indicate positive values after 1c or 2c have indicated negative values, coagulation point has just been reached. This set of conditions is arranged to stop the timing mechanism and gives directly the coagulation time. (8pp288).

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